

## **DO RESIDENTS OF SPRAWLING U.S. METROPOLITAN AREAS EXPERIENCE GREATER HEAT- AND AIR POLLUTION-RELATED MORTALITY?**

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**Background and Aims:** Recent research has found that sprawling U.S. metropolitan regions have experienced double the rate of increase in extreme heat events (EHE) and 50% more high ozone days compared with compact metropolitan regions. During the 2003 European heat wave, heat exposure and elevated pollutant levels were identified as the leading causes of excess mortality. Climate change is projected to increase the frequency and intensity of EHE and air pollution episodes; thus, we sought to examine the link between urban sprawl and climate-induced mortality among large U.S. cities. Specifically, we hypothesize that more sprawling cities have experienced greater mortality from extreme heat and air pollution.

**Methods:** We compiled a database for 60 metropolitan statistical areas (MSAs) that contains a sprawl index (composite measure of population density, land-use mix, street connectivity, and centeredness) and daily ozone concentrations, meteorological variables, and age-standardized warm-season (May–September) mortality rates from all-cause, cardiovascular disease, and respiratory disease during 1987–2006. We calculated the trend in mortality rates over 20 years using linear regression for each MSA and the correlation between urban sprawl and mortality trends for all 60 MSAs. Second, we determined excess mortality during episodes of concurrent EHE and ozone exceedances and examined the association between urban sprawl and excess mortality using multivariate analysis.

**Results:** We found a positive correlation between urban sprawl and mortality trends for respiratory disease ( $r=0.47$ ,  $P<0.01$ ) and all causes ( $r=0.36$ ,  $P<0.01$ ), but not for cardiovascular disease. Analysis of excess mortality during episodes of concurrent EHE and ozone exceedances will be completed by June 2011.

**Conclusions:** The preliminary results from this ecologic study, combined with previous research, suggest that metropolitan structure may be associated with climate-induced mortality from extreme heat and air pollution. These findings will inform practitioners in urban planning and public health on potential climate adaptation strategies.